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TITLE: The electrical properties of indium antimonide films

SOURCE: Kishinev. Universitet. Uchenyye zapiski. v. 49, 1961, 69-77

TEXT: InSb crystals would be a good material for producing Hall emf transmitters if their conductivity were not so high. Therefore it would be of great advantage to have InSb in the form of films with properties not differing too much from those of the crystals. Until now the problem of making these has not been solved, but a rather promising approach to its solution is offered by a film production method described here. The best results were obtained using a 500 mg mixture of 70% In + 30% Sb evaporated from a graphite crucible by heat from a tungsten spiral. The vapor was condensed onto a hot (200-300°C) or cold (20°C) glass backing held in a nickel frame with provision for heating it to 500°C, the whole arrangement being contained in an evacuated glass tube. The glass base was pre-annealed at 400°C. This method made it possible, to obtain films

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of stoichiometric composition, but less easily on evaporating mono- or polycrystalline InSb. Conductivity and Hall coefficient were measured in the usual ways with silver or aquadag ohmic contacts, and the temperature dependences of these coefficients were compared as between films produced under different conditions. Additional annealing (300°C) in vacuo of films condensed onto cold bases increased the mobility and reduced the free-carrier concentration. The carrier concentration of films condensed onto hot bases was not changed by annealing, but the mobility again was raised, this being due to a growth of the grain size. Thus the production of InSb films having carrier mobilities similar to those of polycrystalline InSb is only a question of grain size. Since oxygen forms electron traps, any sorption of air affects also the electric properties. The Hall coefficient of film $\leq 0.1\mu$ thickness depends on the magnetic field strength. There are 5 figures.